

REMARKS

Summary of the Final Office Action

In the Final Office Action dated April 21, 2003, claims 1-10 stand rejected under 35 U.S.C. § 112, first paragraph, as allegedly containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Claims 1-2, 4-6 and 10 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over U.S. Patent No. 5,619,052 to Chang et al. (hereinafter "Chang") in combination with U.S. Patent No. 5,866,474 to Liu (hereinafter "Liu") and pages 440-441 of "Silicon Processing for the VLSI Era, Volume 1" by S.W. Wolf and R.N. Tauber, published by Lattice Press (hereinafter "Wolf") as previously applied. Claims 3 and 7 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Chang in combination with Liu and Wolf as applied to claims 1, 2, 4-6 and 10 above. Claims 8 and 9 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Chang in combination with Liu and Wolf as applied to claims 1, 2, 4-6 and 10 above, and further in view of U.S. Patent No. 6,096,630 to Byun et al. (hereinafter "Byun").

Summary of the Response to the Office Action

Applicants propose to amend claims 1, 2, 4, 5 and 6, and to cancel claim 10, without prejudice or disclaimer. Accordingly, claims 1-9 remain pending in this application.

The Rejections of Claims 1-10 under 35 U.S.C. § 112, first paragraph

Claims 1-10 stand rejected under 35 U.S.C. § 112, first paragraph, as allegedly containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. There is allegedly insufficient guidance to one ordinary skilled in the art to perform the method of claim 1, lines 10-11.

To overcome the above rejections, Applicants propose to cancel independent claim 10 and to amend claims 1-2 and 4-6. Specifically, Applicants propose to amend independent claim 1 to more clearly define the invention so that one of ordinary skill in the art would be able to perform the method of this invention.

Applicants respectfully submit that this amendment is fully supported by the disclosure in the original application as filed. Applicants assert that claims 1-9, as amended, fully comply with the requirements of 35 U.S.C. § 112, first paragraph. Moreover, claim 10 has been cancelled as set forth above. Accordingly, Applicants respectfully request that the rejection of claims 1-10 under 35 U.S.C. § 112, first paragraph, be withdrawn.

The Rejections under 35 U.S.C. § 103(a)

Claims 1-2, 4-6 and 10 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Chang in combination with Liu and Wolf as previously applied. Claims 3 and 7 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Chang in combination with Liu and Wolf as applied to claims 1, 2, 4-6 and 10 above. Claims 8 and 9 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Chang in

combination with Liu and Wolf as applied to claims 1, 2, 4-6 and 10 above, and in further view of Byun.

To the extent that these rejections might be reapplied to these claims as newly amended, Applicants respectfully traverse the rejections of claims 1-9 under 35 U.S.C. § 103(a) for at least the following reasons.

Applicants have cancelled claim 10 and amended independent claim 1, as discussed above. Independent claim 1, as amended above, recites a method of manufacturing a flash memory device that includes:

raising a surrounding temperature from a first temperature of 600-700 °C to a second temperature of 810-850 °C; forming a lower oxide film on the semiconductor substrate including the first polysilicon film at the second temperature; performing a nitridation process to form a nitrogen-containing layer below the lower oxide film at the second temperature; raising the surrounding temperature from the second temperature to a third temperature of 850-950 °C; performing an annealing process at the third temperature using an oxygen gas so that the nitrogen-containing layer is transferred to a surface of the lower oxide film, thus forming a nitride film; decreasing the surrounding temperature from the third temperature to the second temperature; forming an upper oxide film on the nitride film at the second temperature to form a dielectric film including the lower oxide film, the nitride film, and the upper oxide film; and decreasing the surrounding temperature from the second temperature to a temperature substantially below the second temperature.

The Office Action dated April 21, 2003 states at page 3 that Chang, Liu and Wolf are relied upon for the teachings discussed in the rejections of paragraph 10 as stated in the Office Action mailed on November 7, 2002. The prior Office Action dated November 7, 2002 states at page 4 that Chang does not teach the steps of the instant claim 1. Nevertheless, the prior Office Action asserted at page 4 that Liu teaches these steps at column 1, lines 38-50. The prior Office Action dated November 7, 2002 further asserts that it "would have been within the scope to one

of ordinary skill in the art to combine both teachings because it would enable formation of lower oxide film 64 and nitride layer 64 of Chang et al. to be performed.”

Applicants have amended claim 1 as set forth above. Applicants respectfully submit that Liu does not teach at least the steps of claim 1 recited above. As depicted in Figures 1A and 1B, and as discussed at column 1, lines 34 to 50 of Liu, a first oxide 11 is an upper oxide layer, a barrier layer 12 is subsequently formed below the upper oxide layer, and the lower layer 13 is subsequently formed below the barrier layer 12.

On the contrary, in the instant invention as recited in claim 1, a lower oxide film is formed on a polysilicon film at a temperature of 810-850 °C. An nitrogen-containing layer is formed below the lower oxide film by a nitrification process at the temperature of 810-850 °C. The nitrogen-containing layer is transferred to a surface of the lower oxide film by an annealing process at a temperature of 850-950 °C, thus forming a nitride film. An upper oxide film is formed on the nitride film at the temperature of 810-850 °C, thus forming a dielectric film of the flash memory device.

Moreover, Applicants respectfully assert that Wolf does not teach the features of independent claim 1 recited above. Furthermore, Applicants submit that Wolf, Liu and Byun, whether taken singly or in combination, fail to cure the deficiencies of Chang with regard to the features of independent claim 1 recited above. Thus, Applicants respectfully assert that Chang, Liu, and Wolf, whether taken singly or in combination, do not teach or suggest each feature of independent claim 1. As pointed out in MPEP § 2143.03, “[to] establish prima facie obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. In re Royka, 490 F.2d 981, 180 USPQ 580 (CCPA 1974).”

Accordingly, Applicants respectfully submit that independent claim 1 is in condition for allowance as being patentable over Chang in combination with Liu and Wolf. In light of the cancellation of claim 10 as set forth above, the rejection of claim 10 is now moot. Furthermore, Applicants respectfully submit that dependent claims 2-9 should be allowed at least because of their respective dependence upon allowable claim 1. Accordingly Applicants respectfully request that the rejections of claims 1-10 under 35 U.S.C. 103(a) be withdrawn.

Conclusion

In view of the foregoing, Applicants respectfully request entry of the amendments to place the application in clear condition for allowance or, in the alternative, in better form for appeal. Should the Examiner feel that there are any issues outstanding after consideration of this response, the Examiner is invited to contact Applicants' undersigned representative to expedite prosecution.

If there are any other fees due in connection with the filing of this response, please charge the fees to our Deposit Account No. 50-0310. If a fee is required for an extension of time under 37 C.F.R. § 1.136 not accounted for above, such an extension is requested and the fee should also be charged to our Deposit Account.

Respectfully submitted,

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